DOCUMENT RESUME

ED 443 017 CE 080 475

TITLE	Illinois Occupational Skill Standards: Chemical Process Technical Operators.
INSTITUTION	Illinois Occupational Skill Standards and Credentialing Council, Carbondale.
SPONS AGENCY	Illinois State Board of Education, Springfield.
PUB DATE	1999-06-00
NOTE	91p.; For other Illinois Occupational Skill Standards, see CE 080 475-492.
AVAILABLE FROM	Curriculum Publications Clearinghouse, Western Illinois University, Horrabin Hall 46, 1 University Circle, Macomb, IL 61455-1390, Tel: 800-322-3905, Fax: 309-298-2869, E-mail: CPC@wiu.edu. (#512c, $6). For full text: http://www.standards.siu.edu/pdf/manufacturing/chemical.pdf.
PUB TYPE	Guides - Non-Classroom (055) -- Legal/Legislative/Regulatory Materials (090)
EDRS PRICE	MF01/PC04 Plus Postage.
DESCRIPTORS	*Academic Standards; Advisory Committees; *Chemical Technicians; Competence; Competency Based Education; Definitions; Education Work Relationship; Educational Benefits; Educational Needs; Educational Objectives; Employment Potential; Employment Qualifications; Environmental Education; Equipment Maintenance; Equipment Utilization; Evaluation Criteria; Glossaries; Guidelines; Job Skills; Job Training; Labor Force Development; Occupational Clusters; Occupational Safety and Health; *Performance Based Assessment; Program Guides; Safety Education; Secondary Education; *State Standards; Statewide Planning; Student Certification; *Student Evaluation; *Technical Education; Two Year Colleges; Waste Disposal
IDENTIFIERS	Chemical Operators; *Chemical Process Control; Illinois; Materials Handling

ABSTRACT

This document, which is intended for workforce preparation program providers, details the Illinois Occupational Skill Standards for programs preparing students for employment as chemical process technical operators. The document begins with a brief overview of the Illinois perspective on occupational skill standards and credentialing, the process used to develop the skill standards, and assumptions underlying the standards. Presented next are skill standards for 32 tasks performed by chemical process technical operators. Each skill standard statement contains the following components: (1) the skill standard (including the conditions of performance, work to be performed, and performance criteria); (2) performance elements and assessment criteria; and (3) a recommended assessment and credentialing approach. The standards are grouped into the following categories: maintain safety, health, and environmental standards in the plant; handle, store, and transport chemical materials; operate, monitor, and control continuous and batch processes; provide maintenance and service to processes, equipment, and instrumentation; analyze plant materials; and participate in improvement and training activities. Appended are the following: glossary; lists of Illinois Occupational Skill Standards and Credentialing Council, Manufacturing Subcouncil, and Chemical Process

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Technical Operators Standards Development Committee members; Manufacturing Subcouncil Chemical Process Technical Operators recognition proposal; and a list of workplace skills. (MN)

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ILLINOIS

OCCUPATIONAL SKILL STANDARDS

CHEMICAL PROCESS TECHNICAL OPERATORS

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CHEMICAL PROCESS TECHNICAL OPERATORS

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ILLINOIS OCCUPATIONAL SKILL STANDARDS

CHEMICAL PROCESS TECHNICAL OPERATORS

Endorsed for Illinois
by the
Illinois Occupational Skill Standards and Credentialing Council

MESSAGE TO ILLINOIS CITIZENS

Dear Citizens of Illinois:

Preparing youth and adults for entry into the workforce and the ability of individuals to contribute to society throughout their lives is critical to the economy of Illinois. Public and private interest in establishing national and state systems of industry-driven skill standards and credentials is growing in the United States, especially for occupations that require less than a four-year college degree. This interest stems from the understanding that the United States will increasingly compete internationally by increasing the skills and productivity of the front-line workforce. The major purpose of skill standards and credentialing systems is to promote education and training investment and ensure that this education and training enable students and workers to meet industry standards that are benchmarked to our major international competitors.

The Illinois Occupational Skill Standards and Credentialing Council (IOSSCC) has been working with industry subcouncils, the Illinois State Board of Education and other partnering agencies to adopt, adapt and/or develop skill standards for high-demand occupations. This document represents the work of the Manufacturing Subcouncil and the associated standards development committee. Through this collaborative effort, skill standards products are being developed for a myriad of industries, occupational clusters and occupations. Upon completion of these products, there will be a period of feedback and comment from business, industry and labor representatives, as well as educators.

These documents will serve as guides to workforce preparation program providers to define content for their programs and to employers to establish the skills and standards necessary for job acquisition. These standards will also serve as a mechanism for communication among education, business, industry and labor.

We encourage you to review these standards and share your comments. This effort has involved a great many people from business, industry and labor. Comments regarding their usefulness in curriculum and assessment design, as well as your needs for inservice and technical assistance in their implementation, are critical to our efforts to move forward and improve the documents. A feedback instrument is included with this document.

Questions concerning this document may be directed to:

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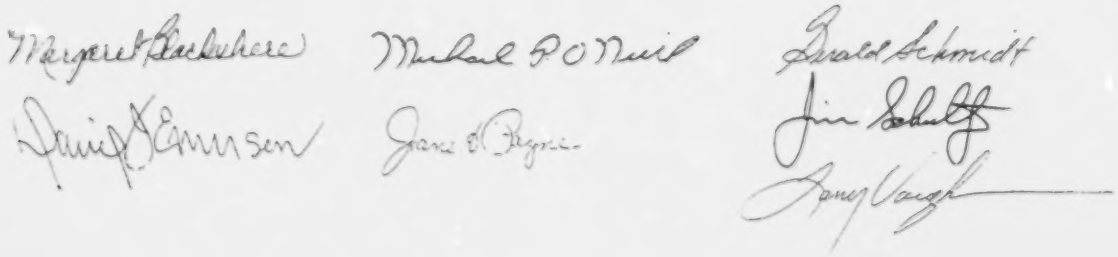
We look forward to your comments.

Sincerely,

The Members of the IOSSCC



THE ILLINOIS PERSPECTIVE

The Illinois Occupational Skill Standards and Credentialing Council (IOSSCC) endorses occupational skill standards and credentialing systems for occupations that (a) require basic workplace skills and technical training, (b) provide a large number of jobs with either moderate or high earnings, and (c) provide career advancement opportunities to related occupations with moderate or high earnings. The nine-member Council was established by the Occupational Skill Standards Act (PA 87-1210). The council, representing business, industry and labor and working with the Illinois State Board of Education in partnership with the Illinois Community College Board, Illinois Board of Higher Education, Illinois Department of Employment Security and Illinois Department of Commerce and Community Affairs, has created a common vision for workforce development in Illinois.

Vision

It is the vision of the IOSSCC to develop a statewide system of industry-defined and recognized skill standards and credentials for all major skilled occupations providing strong employment and earnings opportunities in Illinois. Information related to occupational employment and earning opportunities is determined by the Illinois Occupational Information Coordinating Committee (IOICC) in cooperation with business and industry.

Subcouncils and Standards Development Committees

The Council developed 14 industry subcouncils (representing all major industries in Illinois) to review, approve and promote occupational skill standards and credentialing systems. In cooperation with organizations such as the Illinois Chamber of Commerce, the Illinois AFL-CIO, the Illinois Manufacturers' Association and others, the Council established the first five subcouncils in 1995—Agriculture and Natural Resources, Manufacturing, Health and Social Services, Hospitality, and Business and Administrative/Information Services.

The remaining subcouncils include Applied Science and Engineering Services; Legal and Protective Services; Transportation, Distribution and Logistics; Educational Services; Financial Services; Marketing and Retail Trade; Communications; Construction; and Energy and Utilities.

The Standards Development Committees, composed of business, labor and education representatives, are experts in the related occupational cluster and work with the product developer to

- develop or validate occupational skill standards,
- identify related academic skills,
- develop or review assessment or credentialing approaches, and
- recommend endorsement of the standards and credentialing system to the industry subcouncil.

Expected Benefits for Employers, Educators, Students and Workers

Occupational skill standards and credentialing systems are being developed and promoted by the IOSSCC to improve Illinois' competitiveness. Such standards and credentialing systems provide a common language for employers, workers, students and education and training providers to communicate skill requirements and quality expectations for all major industry and occupational areas.

For Employers, skill standards will

- Improve employee recruitment and retention by more clearly identifying skill requirements,
- Encourage improved responsiveness and performance of education and training providers,
- Enlarge the pool of skilled workers,
- Focus attention on the importance of training investment.

For Education and Training Providers, skill standards will

- Provide information on all major industries and occupations,
- Contribute to program and curriculum development,
- Strengthen relationships between educators and training providers,
- Improve career planning.

For Students and Workers, skill standards will

- Enable better decision making concerning careers and the training necessary to acquire well-paying jobs,
- Allow more effective communication with employers about what they know and can do,
- Allow more effective work with employers in career development and skill upgradin

IOSSCC Requirements for Occupational Skill Standards

Any occupational skill standards and credentialing system seeking IOSSCC endorsement must

- represent an occupation or occupational cluster which meets the criteria for IOSSCC endorsement;
- address both content and performance standards for critical work functions and activities for an occupation or occupational area;
- ensure formal validation and endorsement by a representative group of employers and workers within an industry;
- provide for review, modification and revalidation by an industry group a minimum of once every five years;
- award credentials based on assessment approaches that are supported and endorsed by the industry and consistent with nationally recognized guidelines for validity and reliability;
- provide widespread access and information to the general public in Illinois;
- include marketing and promotion by the industry in cooperation with the partner state agencies.

Definitions and Endorsement Criteria

The definitions and endorsement criteria are designed to promote the integration of existing and future industry-recognized standards, as well as the integration of the Illinois academic and occupational skill standards. Because all skill standards must address the critical work functions and activities for an occupation or industry/occupational area, the Council further defined three major components:

- ***Conditions of Performance:*** The information, tools, equipment and other resources provided to a person for a work performance.
- ***Statement of Work:*** A description of the work to be performed by a person.
- ***Performance Criteria:*** The criteria used to determine the required level of performance. These criteria could include product characteristics (e.g., accuracy levels, appearance), process or procedural requirements (e.g., safety, standard professional procedures) and time and resource requirements. The IOSSCC also requires performance criteria to be further specified by detailed individual performance elements and assessment criteria.

The IOSSCC is currently working with the Illinois State Board of Education and other state agencies to integrate the occupational standards with the Illinois learning standards which describe what students should know and be able to do as a result of their education. The Council is also working to integrate workplace skills—problem solving, critical thinking, teamwork, etc.—with both the learning and occupational skill standards.

The Illinois Model

Illinois Occupational Skill Standards describe what people should know and be able to do and how well these skills and knowledge will be demonstrated in an occupational setting. They focus on the most critical work performances for an occupation or occupational area. As seen in the following model, Illinois Occupational Skill Standards contain at least these three areas:

- Performance Skill
- Skill Standard
- Performance Elements and Assessment Criteria

The following sections may also be included at the discretion of the specific standards development committee:

- Performance Area
- Assessment and Credentialing Approach

Illinois Occupational Skill Standards carry a coding at the top of each page identifying the state, fiscal year in which standards were endorsed, subcouncil abbreviation, cluster abbreviation and standard number. For example, the tenth skill standard in the Chemical Process Technical Operators, which has been developed by the Manufacturing Subcouncil, would carry the following coding: IL.96.MFG.CHEM.10.

A model for Illinois Occupational Skill Standards showing the placement of the coding and providing a description of each area within a standard is contained on the following page.

SUMMARY OF WORK TO BE PERFORMED. SUMMARY IS BRIEF AND BEGINS WITH AN ACTION VERB.

IL. FY. SUBCOUNCIL. CLUSTER. STANDARD NO.

PERFORMANCE AREA

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Includes all information, tools, equipment and other resources provided to the learner for performing the work.

WORK TO BE PERFORMED

Provides an overview of the performance with the major elements or steps being described under Performance Elements and Assessment Criteria.

PERFORMANCE CRITERIA

Includes product characteristics (e.g., accuracy levels, appearance) and/or process or procedure requirements (e.g., safety requirements). Time limits are specified whenever possible.

PERFORMANCE ELEMENTS AND ASSESSMENT CRITERIA

Statement of the major elements, components or steps of the overall performance and the assessment criteria for determining successful performance. Includes all major tasks, the knowledge to be demonstrated and specific assessment criteria.

ASSESSMENT AND CREDENTIALING APPROACH

Optional statement of suggested assessment approaches for the performance which also refers to existing assessment and credentialing systems.

DEVELOPMENTAL PROCESS

The Manufacturing Subcouncil identified chemical process technical operators as a major occupational cluster in manufacturing. Chemical process technical operators operate, control and monitor continuous and batch chemical processes.

The American Chemical Society (ACS) has developed national standards for chemical process technical operators. The American Chemical Society conducted a national validation of the national chemical process technical operator skill standards through regional and state technical working groups and national surveys. These standards include skill standards and employability standards. Employability standards refer to those skills that workers should have before beginning training as a chemical process technical operator.

In Illinois, the national chemical process technical operator skill standards were reformatted to meet the requirements of the Illinois Occupational Skill Standards and Credentialing Council (IOSSCC). A standards development committee was established by the Manufacturing Subcouncil to approve and extend the national standards, as well as oversee the reformatting process. The standards development committee met twice to review, modify and approve the extension and reformatting of the national standards. The Manufacturing Subcouncil and IOSSCC then voted to endorse the national standards as formatted.

The American Chemical Society and the Chemical Industry Council of Illinois (CICI) are committed to maintaining and updating the national chemical process technical operators skill standards for use in Illinois.

ASSUMPTIONS FOR CHEMICAL PROCESS TECHNICAL OPERATIORS

Skill standards statements assume:

1. Workplace skills are expected of all learners. Socialization skills needed for work are related to lifelong career experience and are not solely a part of the initial schooling process. These are not included with this set of statements.

2. Specific policies and procedures of the work site will be made known to the learner and will be followed.

3. Skills will progress from simple to complex. Once a skill has been successfully performed, it will be incorporated into more complex skills.

4. Skill standards describe the skill only and do not detail the background knowledge or theory related to the particular skill base. Although the skill standard enumerates steps to successful demonstration, rote approaches to the outcomes are not prescribed.

5. Employability performance-based skill standards are defined as the skills to be demonstrated at the time of hiring or within 90 days of hiring.

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PERFORM ROUTINE SAFETY AND HEALTH MAINTENANCE PRACTICES.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following equipment, materials and information:

Safety and health procedures
Safety and health checklists
Federal, state and local safety and health regulations
Material Safety Data Sheets (MSDS)
Verbal instructions
Plant buildings, process units and grounds
Equipment (stationary and moving)
Materials and supplies
Tools
Safety equipment

WORK TO BE PERFORMED

Perform safety and health maintenance activities in the plant in compliance with procedural and regulatory standards and requirements.

PERFORMANCE CRITERIA

Performance of safety and health maintenance activities shall be accomplished according to safety and health procedural and checklist requirements and in full compliance with governmental regulatory requirements.

PERFORMANCE ELEMENTS AND ASSESSMENT CRITERIA

- Accessed and properly responded to pertinent safety- and health-related guidelines, procedures, files and other documentation before starting any job.
- Inspected work areas for hazards.
- Alerted co-workers to unsafe and unhealthy conditions.
- Appropriately reported unsafe and unhealthy conditions.
- Complied with procedures for red-tag lockout.
- Handled chemicals safely.
- Correctly implemented confined-space entry procedures.
- Properly labeled materials in the plant.
- Participated in public awareness activities.
- Conducted and participated in safety response drills.
- Participated in the development of an emergency safety plan.
- Used and maintained a radio for communication.
- Participated in the development of Standard Operating Procedures (SOP) for new or modified procedures.

- Properly maintained personal protective equipment.
- Monitored the work area for leaks and spills at all times, using both human senses and instruments.
- Completed required reports and documentation pertaining to the maintenance of plant safety and health standards and verified completeness.

PERFORM ROUTINE ENVIRONMENTAL MAINTENANCE PRACTICES.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following equipment, materials and information:

Environmental procedures
Environmental checklists
Federal, state and local environmental regulations
Material Safety Data Sheets (MSDS)
Verbal instructions
Plant buildings, process units and grounds
Equipment (stationary and moving)
Materials and supplies
Tools
Environmental monitoring equipment and instrumentation

WORK TO BE PERFORMED

Perform environmental maintenance activities in the plant in compliance with all procedural and regulatory standards and requirements.

PERFORMANCE CRITERIA

Performance of environmental maintenance activities shall be accomplished according to all environmental procedural and checklist requirements and in full compliance with governmental regulatory requirements.

PERFORMANCE ELEMENTS AND ASSESSMENT CRITERIA

- Accessed and properly responded to pertinent environment-related guidelines, procedures, files and other documentation before starting any job.
- Inspected work areas for hazards.
- Handled chemicals in an environmentally appropriate manner.
- Worked closely with environmental and regulatory contacts.
- Participated in environmental audits.
- Reported conditions that could have an impact on the environment.
- Properly labeled plant materials.
- Participated in public awareness activities.
- Used and maintained a radio for communication.
- Used monitoring equipment to measure air and water quality to assure environmental compliance.
- Participated in the development of Standard Operating Procedures (SOP) for new or modified procedures.

- Monitored the work area for leaks and spills at all times, using both human senses and instruments.
- Completed required reports and documentation pertaining to the maintenance of plant environmental standards and verified completeness.

PERFORM EMERGENCY RESCUE AND LIFESAVING PRACTICES.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following equipment, materials and information:

Safety and health procedures
Safety and health checklists
Emergency rescue and lifesaving procedures
Federal, state and local safety and health regulations
Verbal instructions
Co-workers
Plant buildings, process units and grounds
Equipment (stationary and moving)
Materials and supplies
Tools
Safety, rescue and lifesaving equipment

WORK TO BE PERFORMED

Perform emergency rescue and lifesaving activities in the plant in compliance with all procedural and regulatory standards and requirements.

PERFORMANCE CRITERIA

Performance of emergency rescue and lifesaving activities shall be accomplished in a safe and timely manner according to all safety, health, rescue and lifesaving procedural and checklist requirements and in full compliance with all governmental regulatory requirements.

PERFORMANCE ELEMENTS AND ASSESSMENT CRITERIA

- Complied with procedures for red-tag lockout.
- Handled chemicals safely.
- Correctly implemented confined-space entry procedures.
- Alerted co-workers about unsafe and unhealthy conditions.
- Appropriately reported unsafe and unhealthy conditions.
- Participated in and conducted emergency rescue and lifesaving drills.
- Participated in development of an emergency safety plan.
- Used and maintained a radio for communication.
- Participated in the development of Standard Operating Procedures (SOP) for new or modified procedures.
- Properly inspected the condition of used and maintained major equipment associated with plant safety, including personal protective equipment, respirators, fire extinguishers, fire blankets and Scott air packs.

- Accessed and properly interpreted procedures for providing approved first-aid techniques for injuries to workers.
- Accessed and properly interpreted procedures to care for a person who becomes incapacitated until official help arrives.
- Monitored the work area for leaks and spills at all times, using human senses and instruments.
- Completed required reports and documentation pertaining to emergency rescue and lifesaving activities and verified completeness.

HANDLE MATERIAL SPILLS.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following equipment, materials and information:

Safety, health and environmental procedures
Safety, health and environmental checklists
Federal, state and local safety, health and environmental regulations
Material Safety Data Sheets (MSDS)
Verbal instructions
Plant buildings, process units and grounds
Equipment (stationary and moving)
Materials and supplies
Safety equipment
Spill-cleanup equipment and supplies

WORK TO BE PERFORMED

Handle material spills in accordance with safety, health and environmental procedural and regulatory requirements.

PERFORMANCE CRITERIA

Handling of material spills shall be performed in a safe and timely manner in full accordance and compliance with applicable safety, health and environmental procedural and governmental regulatory requirements.

PERFORMANCE ELEMENTS AND ASSESSMENT CRITERIA

- Accessed pertinent procedures, files and other documentation for safety, environmental and health guidelines before starting any job and responded appropriately.
- Inspected work areas for hazards.
- Alerted co-workers about unsafe conditions.
- Complied with procedures for red-tag lockout.
- Handled chemicals safely.
- Correctly implemented confined-space entry procedures.
- Investigated accidents and incidents as part of process safety management.
- Worked closely with safety and regulatory contacts.
- Properly reported conditions of concern to the safety or health of self or co-workers or that could have an impact on the environment.
- Properly labeled plant materials.
- Conducted and participated in material-spill-cleanup drills.
- Participated in the development of an emergency safety plan.

- Used and maintained a radio for communication.
- Used monitoring equipment to measure air and water quality to assure environmental compliance.
- Participated in the development of Standard Operating Procedures (SOP) for new or modified procedures.
- Properly inspected the condition of used and maintained major equipment associated with plant safety, including personal protective equipment, respirators, fire extinguishers, fire blankets and Scott air packs.
- Monitored the work area for leaks and spills at all times, using both human senses and instruments.
- Completed required reports and documentation pertaining to the handling and cleanup of material spills and verified completeness.

PARTICIPATE IN ACCIDENT INVESTIGATIONS.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following equipment, materials and information:

Operating procedures
Safety and health procedures
Safety and health checklists
Federal, state and local safety and health regulations
Material Safety Data Sheets (MSDS)
Verbal instructions
Plant buildings, process units and grounds
Equipment (stationary and moving)
Materials and supplies
Tools
Safety equipment

WORK TO BE PERFORMED

Participate in accident investigations in accordance with procedural and regulatory standards and requirements.

PERFORMANCE CRITERIA

Participation in accident investigations shall be accomplished in a conscientious and helpful manner in accordance with safety and health procedural and checklist requirements and in full compliance with governmental regulatory requirements.

PERFORMANCE ELEMENTS AND ASSESSMENT CRITERIA

- Accessed pertinent procedures, files and other documentation for safety, environment and health guidelines before starting any accident investigation and responded appropriately to them.
- Inspected work areas for hazards.
- Alerted co-workers about unsafe conditions.
- Complied with procedures for red-tag lockout.
- Handled chemicals safely.
- Correctly implemented confined-space entry procedures.
- Investigated accidents and incidents as part of process safety management.
- Worked closely with safety and regulatory contacts.
- Reported conditions of concern to the safety or health of self or co-workers.
- Participated in public awareness activities.

- Participated in and conducted safety response drills.
- Used and maintained a radio for communication.
- Properly inspected the condition of used and maintained major equipment associated with plant safety, including personal protective equipment, respirators, fire extinguishers, fire blankets and Scott air packs.
- Monitored the work area for leaks and spills at all times, using both human senses and instruments.
- Participated in the development of Standard Operating Procedures (SOP) for new or modified procedures.
- Accessed and properly interpreted procedures for providing approved first-aid techniques for injuries to workers.
- Accessed and properly interpreted procedures for caring for a person who becomes incapacitated until official help arrives.
- Properly used and interpreted basic problem-solving and investigative tools, such as Pareto charts, flowcharts and cause-and-effect diagrams.
- Completed required reports and documentation pertaining to the accident investigation and verified completeness.

PARTICIPATE IN SAFETY, HEALTH AND ENVIRONMENTAL AUDITS.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following equipment, materials and information:

Operating procedures
Safety, health and environmental procedures
Safety, health and environmental checklists
Federal, state and local safety, health and environmental regulations
Material Safety Data Sheets (MSDS)
Verbal instructions
Plant buildings, process units and grounds
Equipment (stationary and moving)
Materials and supplies
Tools
Safety equipment
Environmental monitoring equipment and instrumentation

WORK TO BE PERFORMED

Participate in safety, health and environmental audits in accordance with procedural and regulatory standards and requirements.

PERFORMANCE CRITERIA

Participation in safety, health and environmental audits shall be accomplished in a conscientious and helpful manner in accordance with safety, health and procedural and checklist requirements and in full compliance with governmental regulatory requirements.

PERFORMANCE ELEMENTS AND ASSESSMENT CRITERIA

- Accessed pertinent procedures, files and other documentation for safety, environmental and health guidelines before starting any audit and responded appropriately to them.
- Audited work areas for hazards.
- Alerted co-workers about unsafe conditions.
- Audited compliance with procedures for red-tag lockout.
- Audited safe handling of all chemicals.
- Audited correct implementation of confined-space entry procedures.
- Audited completeness of accident and incident investigations, including paperwork.
- Audited conditions of concern to the safety or health of self or co-workers or conditions that could have an impact on the environment.

- Audited plant materials for proper labeling.
- Participated in public awareness activities.
- Participated in the development of an emergency safety plan.
- Audited proper use and maintenance of radios for communication.
- Audited use of monitoring equipment to measure air and water quality to assure environmental compliance.
- Participated in the development of Standard Operating Procedures (SOP) for new or modified procedures.
- Audited the monitoring of work areas for leaks and spills at all times, using human senses and instruments.
- Audited the accuracy and completeness of required reports and documentation pertaining to the maintenance of plant safety, health and environment standards.
- Reported discrepancies found in the audit to appropriate authorities and recommended corrective actions where appropriate.
- Accessed and properly interpreted applicable federal, state and local regulations.
- Audited the condition, use and maintenance of major equipment associated with plant safety, including personal protective equipment, respirators, fire extinguishers, fire blankets and Scott air packs.
- Completed audit reports and documentation and verified them for accuracy and completeness.

RECEIVE AND VERIFY INCOMING MATERIALS.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following equipment, materials and information:

Production schedule
Receiving procedure
Receiving checklist
Materials specifications
Material Safety Data Sheets (MSDS)
Material identification procedure
Federal, state and local safety, health and environmental regulations
Verbal instructions
Incoming materials
Ships, trucks, railroads and other carriers
Material-handling equipment

WORK TO BE PERFORMED

Receive and verify incoming materials according to production schedule and material specification requirements.

PERFORMANCE CRITERIA

Receiving and verification of incoming materials shall be accomplished in a safe, accurate and timely manner in accordance with receiving procedure and material specification requirements and applicable safety, health and environmental guidelines and governmental regulations.

PERFORMANCE ELEMENTS AND ASSESSMENT CRITERIA

- Accessed and appropriately responded to pertinent procedures, files, regulations and other documentation relating to the receiving and verification of incoming materials.
- Arranged for materials and products to be unloaded from ships, trucks, railroads and other carriers.
- Followed proper handling techniques, using proper personal, protective equipment, for transferring materials from vessels, tanks, barrels and other storage devices.
- Completed and verified proper paperwork associated with receiving and verifying incoming materials.
- Completed paperwork and reporting procedures for major regulatory agencies.
- Arranged for materials to be transferred to storage or processing units.

- Properly labeled materials.
- Measured specified properties of materials according to ASTM (American Society for Testing and Materials) or other pertinent standards to ensure that specifications are met.
- Matched material identification and documentation against purchase order or other receiving paperwork.
- Properly segregated or otherwise disposed of wrong or nonconforming incoming materials and notified appropriate personnel.
- Handled materials in accordance with safety, environmental and health guidelines as outlined in SOPs (Standard Operating Procedures) and MSDS (Material Safety Data Sheets).
- Arranged for the clean up of material spills.
- Responded to emergencies.
- Wrote an SOP describing unloading and loading procedures for different types of materials for at least two different modes of transportation.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following equipment, materials and information:

Production schedule
Material-handling procedure
Material-handling checklist
Materials specifications
Material Safety Data Sheets (MSDS)
Material identification procedure
Federal, state and local safety, health and environmental regulations
Verbal instructions
Chemical materials
Material-handling equipment

WORK TO BE PERFORMED

Handle, store and transport materials according to production schedule and material specification requirements.

PERFORMANCE CRITERIA

Handling, storage and transportation of materials shall be accomplished in a safe, accurate and timely manner, according to material-handling procedure and material specification requirements and also in accordance with applicable safety, health and environmental guidelines and governmental regulations.

PERFORMANCE ELEMENTS AND ASSESSMENT CRITERIA

- Accessed and appropriately responded to pertinent procedures, files, regulations and other documentation relating to the handling, storing and transporting of materials at all stages of processing.
- Properly handled, stored and transported materials at all stages of processing.
- Properly transferred materials to and from storage or processing units or arranged transfer.
- Completed pertinent paperwork associated with handling, storing and transporting materials and verified completeness.
- Completed paperwork and reporting procedures for major regulatory agencies.
- Properly labeled materials.
- Measured specified properties according to ASTM (American Society for Testing and Materials) or other pertinent standards to ensure that specifications are met.

- Matched material identification and documentation against production schedule and other processing paperwork.
- Properly segregated or otherwise disposed of wrong or nonconforming materials and notified appropriate personnel.
- Maintained material inventories.
- Maintained storage facilities.
- Inspected the tank farm and verified the identity and quantity of the contents of each container.
- Transferred materials from processes or units to containers in the case of continuous processes in compliance with plant procedures and customer specifications.
- Handled materials using safety, environmental and health guidelines as outlined in SOPs (Standard Operating Procedures) and MSDSs (Material Safety Data Sheets).
- Arranged for the clean up of material spills.
- Responded to emergencies.

MAINTAIN MATERIAL IDENTIFICATION AND TRACEABILITY.

HANDLE, STORE AND TRANSPORT CHEMICAL MATERIALS

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following equipment, materials and information:

Production schedule
Material identification procedure
Material identification checklist
Materials specifications
Material Safety Data Sheets (MSDS)
Federal, state and local safety, health and environmental regulations
Verbal instructions
Chemical materials
Material-handling equipment

WORK TO BE PERFORMED

Maintain the identification and traceability of incoming, in-process and outgoing materials and products according to production schedule and material identification requirements.

PERFORMANCE CRITERIA

Maintenance of material identification and traceability shall be accomplished in a safe, accurate and timely manner in accordance with material identification procedure and material specification requirements and applicable safety, health and environmental guidelines and governmental regulations.

PERFORMANCE ELEMENTS AND ASSESSMENT CRITERIA

- Accessed and appropriately responded to pertinent procedures, files, regulations and other documentation relating to the maintenance of material identity and traceability.
- Identified materials in conformance with all safety, environmental and health guidelines as outlined in SOPs (Standard Operating Procedures) or MSDS (Material Safety Data Sheets) and in applicable federal, state and local regulations.
- Completed paperwork associated with material identity and traceability and verified completeness.
- Completed paperwork and reporting procedures for major regulatory agencies.
- Verified the accuracy and completeness of material identification documentation at every stage of receiving, processing, handling, storage, transporting and shipping materials.

- Matched material identification and documentation against receiving, processing, handling, storage, transporting and shipping documentation and paperwork.
- Properly segregated or otherwise disposed of wrongly identified or nonconforming materials and notified appropriate personnel.
- Labeled materials properly.
- Verified the identity and quantity of the contents of each storage container.
- Maintained material identity during the transfer of materials from processes or units to containers in the case of continuous processes.
- Prepared and verified shipping papers or supplied the data to the appropriate shipping clerk.
- Assured the maintenance of material identity during the cleanup of all spills.
- Conformed to standard container-labeling procedures.

SEGREGATE AND CONTROL NONCONFORMING MATERIALS.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following equipment, materials and information:

Production schedule
Operating procedure
Operating checklist
Materials specifications
Material Safety Data Sheets (MSDS)
Material identification procedure
Material control procedure
Federal, state and local safety, health and environmental regulations
Verbal instructions
Designated material segregation areas
Nonconforming chemical materials

WORK TO BE PERFORMED

Segregate and control nonconforming materials to production schedule, material control procedure and material specification requirements.

PERFORMANCE CRITERIA

Segregation and control of nonconforming materials shall be accomplished in a safe, accurate and timely manner in full compliance with material control procedure and material specification requirements and in full accordance with applicable plant and governmental safety, health and environmental guidelines and regulations.

PERFORMANCE ELEMENTS AND ASSESSMENT CRITERIA

- Responded to and accessed pertinent procedures, files, regulations and other documentation relating to the segregation and control of nonconforming materials.
- Measured specified properties according to ASTM (American Society for Testing and Materials) or other pertinent standards to ensure that materials meet specification requirements.
- Verified the accuracy and completeness of material identification documentation at every stage of receiving, processing, handling, storage, transporting and shipping and matched it against applicable process and schedule documentation and paperwork.
- Properly segregated or disposed of wrong or nonconforming materials at all stages of processing, maintained inventories and notified appropriate personnel.

- Identified, labeled, handled and transferred in conformance with applicable safety, environmental and health guidelines nonconforming materials as outlined in operating procedures, Material Safety Data Sheets (MSDS) and federal, state and local regulations.
- Completed paperwork associated with the segregation and control of nonconforming materials, including reporting procedures for applicable regulatory agencies, and verified it for accuracy.
- Maintained inventories of nonconforming materials.
- Participated in Material Review Board (MRB) activities.

MAINTAIN MATERIAL INVENTORIES.

HANDLE, STORE AND TRANSPORT CHEMICAL MATERIALS

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following equipment, materials and information:

Production schedule
Material control procedure
Inventory control procedure
Inventory control checklist
Material specifications
Material Safety Data Sheets (MSDS)
Material identification procedure
Federal, state and local safety, health and environmental regulations
Verbal instructions
Storage facilities
Chemical materials
Inventory databases and documentation

WORK TO BE PERFORMED

Maintain material inventories according to production schedule and procedural and material specification requirements.

PERFORMANCE CRITERIA

Maintenance of material inventories shall be accomplished in a safe, accurate and timely manner in full compliance with applicable plant procedures, material specification requirements and applicable safety, health and environmental guidelines and governmental regulations.

PERFORMANCE ELEMENTS AND ASSESSMENT CRITERIA

- Responded to and accessed pertinent procedures, files, regulations and documentation relating to the maintenance of materials.
- Completed paperwork associated with the maintenance of material inventories and verified completeness.
- Completed paperwork and reporting procedures for major regulatory agencies.
- Maintained record of the identity and quantity of materials in storage.
- Properly labeled materials and containers.
- Matched actual material identification and documentation against storage and in-process paperwork or database.
- Properly identified and stored wrong or nonconforming incoming materials to adequately segregate them from conforming materials and products.

- Maintained material inventory databases, paper or computerized.
- Participated in physical inventory activities.
- Prepared and verified shipping papers or supplied shipping data to the appropriate shipping clerk.
- Wrote a Standard Operating Procedure (SOP) which describes material storage and inventory-control procedures for different types of materials for at least two different modes of storage.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following equipment, materials and information:

Production schedule
Shipping procedure
Shipping checklist
Materials specifications
Material Safety Data Sheets (MSDS)
Material identification procedure
Federal, state and local safety, health and environmental regulations
Verbal instructions
Ships, trucks, railroads and other carriers
Outgoing products
Material-handling equipment

WORK TO BE PERFORMED

Handle finished, outgoing products to production schedule and material specification requirements.

PERFORMANCE CRITERIA

Handling of finished, outgoing materials shall be accomplished in a safe, accurate and timely manner according to shipping procedure and material specification requirements and also in accordance with applicable safety, health and environmental guidelines and governmental regulations.

PERFORMANCE ELEMENTS AND ASSESSMENT CRITERIA

- Accessed and responded to pertinent procedures, files, regulations and documentation relating to the handling of finished, outgoing products.
- Prepared and shipped materials and products on ships, trucks, railroads and other carriers.
- Completed paperwork associated with preparing and shipping finished, outgoing products and verified completeness.
- Completed paperwork and reporting procedures for major regulatory agencies.
- Loaded materials and products onto ships, trucks, railroad cars and other carriers or arranged loading.
- Properly labeled materials and containers.
- Measured specified properties according to ASTM (American Society for Testing and Materials) or other pertinent standards to ensure that materials meet specifications.

- Matched material identification and documentation against shipping paperwork.
- Properly segregated or otherwise disposed of wrong or nonconforming outgoing materials and notified appropriate personnel.
- Adjusted inventory records to reflect materials removed for shipping.
- Prepared and verified shipping papers or supplied shipping data to the appropriate shipping clerk.
- Handled materials using safety, environmental and health guidelines as outlined in SOPs (Standard Operating Procedures) and MSDSs (Material Safety Data Sheets).
- Arranged for the cleanup of material spills.
- Wrote an SOP which describes a loading procedure for different types of materials for at least two different modes of transportation.

INSPECT AND QUALIFY SHIPPING CONTAINERS.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following equipment, materials and information:

Production schedule
Receiving, handling and shipping procedures
Receiving, handling and shipping checklists
Material and container specifications
Material Safety Data Sheets (MSDS)
Federal, state and local safety, health and environmental regulations
Verbal instructions
Incoming, in-process and outgoing materials
Incoming, in-process and outgoing shipping containers
Material-handling equipment
Container cleaning and decontamination equipment and supplies

WORK TO BE PERFORMED

Inspect and qualify shipping containers according to production schedule and applicable procedural, specification and regulatory requirements.

PERFORMANCE CRITERIA

Inspection and qualification of shipping containers shall be accomplished in a safe, accurate and timely manner, according to all operating procedure and material specification requirements and in full compliance with applicable safety, health and environmental guidelines and governmental regulations.

PERFORMANCE ELEMENTS AND ASSESSMENT CRITERIA

- Responded to pertinent procedures, files, regulations and documentation relating to the inspection and qualification of shipping containers.
- Properly labeled shipping containers.
- Inspected material transport equipment (trucks, railcars, barges, etc.) for mechanical integrity and reported nonconformances to standards to appropriate personnel.
- Appropriately inspected, cleaned, decontaminated or disposed of used storage drums, barrels and containers.
- Properly segregated or otherwise disposed of wrong or nonconforming shipping containers and notified appropriate personnel.
- Completed paperwork associated with inspecting and qualifying shipping containers and verified completeness.
- Completed paperwork and reporting procedures for major regulatory agencies.

- Handled shipping containers using safety, environmental and health guidelines as outlined in SOPs (Standard Operating Procedures) and MSDSs (Material Safety Data Sheets).
- Wrote an SOP which describes shipping container inspection, cleaning and decontamination procedure for at least two different types of containers.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following equipment, materials and information:

Production schedule
Startup procedure
Startup checklist
Product specifications
Process-variable specifications
Verbal instructions
Incoming materials
Process equipment
Control instrumentation

WORK TO BE PERFORMED

Start up a continuous process to produce output to production schedule and product specification requirements.

PERFORMANCE CRITERIA

Continuous process startup shall be accomplished according to all startup procedure requirements and in a safe and timely manner. The process will produce an output which fully conforms to product specifications at an optimal process efficiency.

PERFORMANCE ELEMENTS AND ASSESSMENT CRITERIA

- Accessed and responded to common operating procedures and checklists, process diagrams, environmental regulations and safety information as provided by Material Safety Data Sheets (MSDS).
- Completed reports to describe process startup activities, abnormal conditions, discrepancies and maintenance.
- Started up the process according to startup procedures and checklists.
- Checked equipment and instrumentation to ensure safety for electrical loading, physical stressing and temperature variation.
- Set and operated process measurement and control instrumentation and equipment such as thermocouples and computers as specified by procedures.
- Adjusted operating parameters to optimize process conditions.
- Monitored operating parameters by reading gauges, instruments and meters and by logging or otherwise recording data and information as necessary.
- Recognized and corrected process deviations.

- Responded to alarms and upset conditions.
- Collected and analyzed (or submitted for analysis) appropriate samples according to ASTM (American Society for Testing and Materials) or other pertinent standards to ensure conformance to material specifications.
- Conducted on-site inspections.
- Recorded, entered, retrieved and reported process data and information as required.
- Maintained piping networks.
- Wrote documentation for a startup procedure that meets Occupational Health and Safety Administration (OSHA) requirements.
- Restarted the process after an emergency shutdown.
- Provided shift transfer notes.
- Properly entered and interpreted data on SPC (Statistical Process Control) charts.

OPERATE, MONITOR AND CONTROL CONTINUOUS PROCESSES

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following equipment, materials and information:

Production schedule
Operating procedure
Product specifications
Process-variable specifications
Verbal instructions
Incoming materials
Process equipment
Control instrumentation

WORK TO BE PERFORMED

Operate, monitor and control a continuous process to produce output to production schedule and product specification requirements.

PERFORMANCE CRITERIA

Continuous process operation, monitoring and control shall be accomplished according to all operating procedure requirements and in a safe manner. The process will produce an output which fully conforms to product specifications at an optimal process efficiency.

PERFORMANCE ELEMENTS AND ASSESSMENT CRITERIA

- Accessed and responded to common operating procedures and checklists, process diagrams, environmental regulations and safety information as provided by Material Safety Data Sheets (MSDS).
- Completed reports to describe process activities, abnormal conditions, discrepancies and maintenance.
- Operated, monitored and controlled process according to operating procedures and checklists.
- Checked equipment and instrumentation to ensure safety for electrical loading, physical stressing and temperature variation.
- Set and operated measurement and control instrumentation and equipment such as thermocouples and computers as specified by procedures.
- Adjusted operating parameters to optimize process conditions.
- Monitored operating parameters by reading gauges, instruments and meters and by logging or otherwise recording data and information as necessary.
- Recognized and corrected process deviations.
- Responded to alarms and upset conditions.

- Collected and analyzed (or submitted for analysis) appropriate samples according to ASTM (American Society for Testing and Materials) or other pertinent standards to ensure conformance to material specifications.
- Conducted on-site inspections.
- Recorded, entered, retrieved and reported process data and information as required.
- Maintained piping networks.
- Restarted the process after an emergency shutdown.
- Wrote documentation for an operating procedure that meets Occupational Safety and Health Administration (OSHA) requirements.
- Provided shift transfer notes.
- Properly entered and recorded data on SPC (Statistical Process Control) charts.

CHANGE OVER CONTINUOUS PROCESSES.

OPERATE, MONITOR AND CONTROL CONTINUOUS PROCESSES

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following equipment, materials and information:

Production schedule
Change-over procedure
Change-over checklist
Product specifications
Process variable specifications
Verbal instructions
Incoming materials
Process equipment
Control instrumentation

WORK TO BE PERFORMED

Change over a continuous process to produce changed output to production schedule and product specification requirements.

PERFORMANCE CRITERIA

Continuous process change-over shall be accomplished according to change-over procedure requirements and in a safe and timely manner. The process will produce a changed output which fully conforms to product specifications at an optimal process efficiency.

PERFORMANCE ELEMENTS AND ASSESSMENT CRITERIA

- Accessed and responded to common operating procedures and checklists, process diagrams, environmental regulations and safety information as provided by Material Safety Data Sheets (MSDS).
- Completed reports to describe changeover activities, abnormal conditions, discrepancies and maintenance.
- Changed over the process according to change-over procedures and checklists.
- Checked equipment and instrumentation to ensure safety for electrical loading, physical stressing and temperature variation.
- Set and operated process measurement and control instrumentation and equipment such as thermocouples and computers as specified by procedures.
- Adjusted operating parameters to optimize process conditions.
- Monitored operating parameters by reading gauges, instruments and meters and by logging or otherwise recording data and information as necessary.
- Recognized and corrected process deviations.
- Responded to alarms and upset conditions.

- Collected and analyzed (or submitted for analysis) appropriate samples according to ASTM (American Society for Testing and Materials) or other pertinent standards, to ensure conformance to material specifications.
- Conducted on-site inspections.
- Recorded, entered, retrieved and reported process data and information as required.
- Maintained piping networks.
- Restarted the process after an emergency shutdown.
- Wrote documentation for a changeover procedure that meets Occupational Safety and Health Administration (OSHA) requirements.
- Provided shift transfer notes.
- Properly entered and recorded data on SPC (Statistical Process Control) charts.

SHUT DOWN CONTINUOUS PROCESSES (ROUTINE).

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following equipment, materials and information:

Production schedule
Routine shutdown procedure
Routine shutdown checklist
Verbal instructions
Incoming materials
Process equipment
Control instrumentation

WORK TO BE PERFORMED

Shut down a continuous process to end production of output according to production schedule requirements.

PERFORMANCE CRITERIA

Routine process shutdown shall be accomplished according to shutdown procedure requirements and in a safe and timely manner.

PERFORMANCE ELEMENTS AND ASSESSMENT CRITERIA

- Accessed and responded to common operating procedures and checklists, process diagrams, environmental regulations and safety information as provided by Material Safety Data Sheets (MSDS).
- Completed reports to describe routine process shutdown activities, abnormal conditions, discrepancies and maintenance.
- Shut down the process according to routine shutdown procedures and checklists.
- Checked equipment and instrumentation to ensure safety for electrical loading, physical stressing and temperature variation.
- Set and operated process measurement and control instrumentation and equipment such as thermocouples and computers as specified by procedures.
- Monitored operating parameters by reading gauges, instruments and meters and by logging or otherwise recording data and information as necessary.
- Recognized and corrected process deviations.
- Responded to alarms and upset conditions.
- Collected and analyzed (or submitted for analysis) appropriate samples according to ASTM (American Society for Testing and Materials) or other pertinent standard to ensure conformance to material specifications.
- Conducted on-site inspections.

- Recorded, entered, retrieved and reported process data and information as required.
- Maintained piping networks.
- Wrote documentation for a routine shutdown procedure that meets Occupational Safety and Health Administration (OSHA) requirements.
- Provided shift transfer notes.
- Properly entered and interpreted data on SPC (Statistical Process Control) charts.

SHUT DOWN CONTINUOUS PROCESSES (EMERGENCY).

OPERATE, MONITOR AND CONTROL CONTINUOUS PROCESSES

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following equipment, materials and information:

Production schedule
Emergency shutdown procedure
Emergency shutdown checklist
Verbal instructions
Incoming materials
Process equipment
Control instrumentation

WORK TO BE PERFORMED

Shut down a continuous process in an emergency situation.

PERFORMANCE CRITERIA

Emergency process shutdown shall be accomplished according to emergency shutdown procedure requirements and in a safe and timely manner.

PERFORMANCE ELEMENTS AND ASSESSMENT CRITERIA

- Accessed and responded to common operating procedures and checklists, process diagrams, environmental regulations and safety information as provided by Material Safety Data Sheets (MSDS).
- Completed reports to describe emergency process shutdown activities, abnormal conditions, discrepancies and maintenance.
- Shut down the process according to emergency shutdown procedures and checklists.
- Checked equipment and instrumentation to ensure safety for electrical loading, physical stressing and temperature variation.
- Set and operated process measurement and control instrumentation and equipment such as thermocouples and computers as specified by procedures.
- Monitored operating parameters by reading gauges, instruments and meters and by logging or otherwise recording data and information as necessary.
- Recognized and corrected process deviations.
- Responded to alarms and upset conditions.
- Collected and analyzed (or submitted for analysis) appropriate samples according to ASTM (American Society for Testing and Materials) or other pertinent standard to ensure conformance to material specifications.

- Conducted on-site inspections.
- Recorded, entered, retrieved and reported process data and information as required.
- Maintained piping networks.
- Wrote documentation for an emergency shutdown procedure that meets Occupational Safety and Health Administration (OSHA) requirements.
- Provided shift transfer notes.
- Properly entered and interpreted data on SPC (Statistical Process Control) charts.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following equipment, materials and information:

Production schedule
Startup procedure
Startup checklist
Product specifications
Process-variable specifications
Verbal instructions
Incoming materials
Process equipment
Control instrumentation

WORK TO BE PERFORMED

Start up a batch process to produce output to production schedule and product specification requirements.

PERFORMANCE CRITERIA

Batch process startup shall be accomplished according to all startup procedure requirements and in a safe and timely manner.

PERFORMANCE ELEMENTS AND ASSESSMENT CRITERIA

- Accessed and responded to common operating procedures and checklists, process diagrams, environmental regulations and safety information as provided by Material Safety Data Sheets (MSDS).
- Completed reports to describe process startup activities, abnormal conditions, discrepancies and maintenance.
- Measured raw materials.
- Started up the process according to startup procedures and checklists.
- Checked the equipment and instrumentation to ensure safety for electrical loading, physical stressing and temperature variation.
- Set and operated process measurement and control instrumentation and equipment such as thermocouples and computers as specified by procedures.
- Adjusted operating parameters to optimize process conditions.
- Monitored operating parameters by reading gauges, instruments and meters and by logging or otherwise recording data and information as necessary.
- Recognized and corrected process deviations.
- Responded to alarms and upset conditions.

- Collected and analyzed (or submitted for analysis) appropriate samples according to ASTM (American Society for Testing and Materials) or other pertinent standards to ensure conformance to material specifications.
- Conducted on-site inspections.
- Recorded, entered, retrieved and reported process data and information as required.
- Maintained piping networks.
- Wrote documentation for a startup procedure that meets Occupational Safety and Health Administration (OSHA) requirements.
- Restarted the process after an emergency shutdown.
- Provided shift transfer notes.
- Properly entered and interpreted data on SPC (Statistical Process Control) charts.

OPERATE, MONITOR AND CONTROL BATCH PROCESSES.

OPERATE, MONITOR AND CONTROL BATCH PROCESSES

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following equipment, materials and information:

Production schedule
Operating procedure
Product specifications
Process-variable specifications
Verbal instructions
In-process materials
Process equipment
Control instrumentation

WORK TO BE PERFORMED

Operate, monitor and control a batch process to produce output to production schedule and product specification requirements.

PERFORMANCE CRITERIA

Batch operation, monitoring and control shall be accomplished in a safe manner and according to operating procedure requirements. The process will produce an output which fully conforms to product specifications at an optimal process efficiency.

PERFORMANCE ELEMENTS AND ASSESSMENT CRITERIA

- Accessed and responded to common operating procedures and checklists, process diagrams, environmental regulations and safety information as provided by Material Safety Data Sheets (MSDS).
- Completed reports to describe process activities, abnormal conditions, discrepancies and maintenance.
- Operated, monitored and controlled the process according to operating procedures and checklists.
- Checked equipment and instrumentation to ensure safety for electrical loading, physical stressing and temperature variation.
- Set and operated process measurement and control instrumentation and equipment such as thermocouples and computers as specified by procedures.
- Adjusted operating parameters to optimize process conditions.
- Monitored operating parameters by reading gauges, instruments and meters and by logging or otherwise recording data and information as necessary.
- Recognized and corrected process deviations.
- Responded to alarms and upset conditions.

- Collected and analyzed (or submitted for analysis) appropriate samples according to ASTM (American Society for Testing and Materials) or other pertinent standards to ensure conformance to material specifications.
- Conducted on-site inspections.
- Recorded, entered, retrieved and reported process data and information as required.
- Maintained piping networks.
- Restarted the process after an emergency shutdown.
- Wrote documentation for an operating procedure that meets Occupational Safety and Health Administration (OSHA) requirements.
- Provided shift transfer notes.
- Properly entered and recorded data on SPC (Statistical Process Control) charts.

SHUT DOWN BATCH PROCESSES (ROUTINE).

OPERATE, MONITOR AND CONTROL BATCH PROCESSES

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following equipment, materials and information:

Production schedule
Routine shutdown procedure
Routine shutdown checklist
Verbal instructions
Process equipment
Control instrumentation

WORK TO BE PERFORMED

Shut down a routine batch process to end production of output according to production schedule requirements.

PERFORMANCE CRITERIA

Batch process shutdown shall be accomplished in a safe and timely manner according to shutdown procedure requirements.

PERFORMANCE ELEMENTS AND ASSESSMENT CRITERIA

- Accessed and responded to common operating procedures and checklists, process diagrams, environmental regulations and safety information as provided by Material Safety Data Sheets (MSDS).
- Completed reports to describe routine process shutdown activities, abnormal conditions, discrepancies and maintenance.
- Shut down the process according to routine shutdown procedures and checklists.
- Checked equipment and instrumentation to ensure safety for electrical loading, physical stressing and temperature variation.
- Set and operated process measurement and control instrumentation and equipment such as thermocouples and computers as specified by procedures.
- Monitored operating parameters by reading gauges, instruments and meters and by logging or otherwise recording data and information as necessary.
- Recognized and corrected process deviations.
- Responded to alarms and upset conditions.
- Collected and analyzed (or submitted for analysis) appropriate samples according to ASTM (American Society for Testing and Materials) or other pertinent standard to ensure conformance to material specifications.

- Conducted on-site inspections.
- Recorded, entered, retrieved and reported process data and information as required.
- Maintained piping networks.
- Discharged final product according to specified procedures.
- Wrote documentation for a routine shutdown procedure that meets Occupational Safety and Health Administration (OSHA) requirements.
- Provided shift transfer notes.
- Properly entered and interpreted data on SPC (Statistical Process Control) charts.

SHUT DOWN BATCH PROCESSES (EMERGENCY).

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following equipment, materials and information:

Production schedule
Emergency-shutdown procedure
Emergency-shutdown checklist
Verbal instructions
Process equipment
Control instrumentation

WORK TO BE PERFORMED

Shut down a batch process in an emergency situation.

PERFORMANCE CRITERIA

Emergency process shutdown shall be accomplished according to emergency-shutdown procedure requirements in a safe and timely manner.

PERFORMANCE ELEMENTS AND ASSESSMENT CRITERIA

- Accessed and responded to common operating procedures and checklists, process diagrams, environmental regulations and safety information as provided by Material Safety Data Sheets (MSDS).
- Completed reports to describe emergency process shutdown activities, abnormal conditions, discrepancies and maintenance.
- Shut down the process according to emergency-shutdown procedures and checklists.
- Checked equipment and instrumentation to ensure safety for electrical loading, physical stressing and temperature variation.
- Set and operated process measurement and control instrumentation and equipment such as thermocouples and computers as specified by procedures.
- Monitored operating parameters by reading gauges, instruments and meters and by logging or otherwise recording data and information as necessary.
- Recognized and corrected process deviations.
- Responded to alarms and upset conditions.
- Collected and analyzed (or submitted for analysis) appropriate samples according to ASTM (American Society for Testing and Materials) or other pertinent standards to ensure conformance to material specifications.
- Conducted on-site inspections.
- Recorded, entered, retrieved and reported process data and information as required.

- Maintained piping networks.
- Wrote documentation for an emergency-shutdown procedure that meets Occupational Safety and Health Administration (OSHA) requirements.
- Provided shift transfer notes.
- Properly entered and interpreted data on SPC (Statistical Process Control) charts.

PROVIDE ROUTINE AND PREVENTIVE MAINTENANCE AND SERVICE TO PROCESS EQUIPMENT.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following equipment, materials and information:

Production schedule
Maintenance and service schedule
Maintenance and service procedures
Maintenance and service checklists
Equipment specifications
Verbal instructions
Maintenance equipment, tools and instruments
Maintenance supplies
Process equipment

WORK TO BE PERFORMED

Provide routine and preventive maintenance and service to process equipment to meet production schedule and equipment specification requirements.

PERFORMANCE CRITERIA

Routine and preventive maintenance and service shall be performed according to all maintenance and service schedule and procedure requirements resulting in process equipment which meets equipment specification requirements and is fully capable of producing products conforming to output specifications.

The work shall be accomplished in a safe, timely and cost-effective manner.

PERFORMANCE ELEMENTS AND ASSESSMENT CRITERIA

- Accessed and properly responded to Standard Operating Procedures (SOPs) and checklists associated with the maintenance and service of the processes and equipment before starting any work.
- Observed, communicated and recorded deviations from normal operations and deteriorating conditions of processes and equipment using both human senses and instruments.
- Initiated work requests.
- Developed and implemented a preventive maintenance schedule according to good process management standards.
- Inspected equipment.
- Prepared equipment for maintenance.
- Followed the maintenance and service schedule developed by plant personnel.
- Opened lines and equipment.

- Changed seals and valves on on-line equipment.
- Changed seals and packing on pumps and valves.
- Changed and replaced pipes as required.
- Checked fluid levels in process equipment.
- Performed vibrational analysis.
- Performed steam-tracing techniques.
- Tested and replaced pressure release valves as needed.
- Completed reports to describe equipment maintenance and service activities and discrepancies.
- Wrote the documentation for a maintenance procedure that meets Occupational Safety and Health Administration (OSHA) requirements.
- Properly used and inspected hand tools.

TROUBLESHOOT AND CORRECT NONROUTINE PROCESS EQUIPMENT PROBLEMS.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following equipment, materials and information:

Production schedule
Maintenance and service schedule
Maintenance and service procedures
Maintenance and service checklists
Equipment specifications
Verbal instructions
Maintenance equipment, tools and instruments
Maintenance supplies
Process equipment

WORK TO BE PERFORMED

Troubleshoot and correct nonroutine process equipment problems to meet production schedule and equipment specification requirements.

PERFORMANCE CRITERIA

Troubleshooting and correction of nonroutine process equipment problems shall be performed according to maintenance and service procedure and checklist requirements resulting in process equipment which meets equipment specification requirements and is fully capable of producing products conforming to output specifications.

The work shall be accomplished in a safe, timely and cost-effective manner.

PERFORMANCE ELEMENTS AND ASSESSMENT CRITERIA

- Accessed and properly responded to Standard Operating Procedures (SOPs) and checklists associated with the troubleshooting and correction of nonroutine process problems before starting any work.
- Observed, communicated and recorded deviations from normal operations and deteriorating conditions of processes and equipment using both human senses and instruments.
- Initiated work requests.
- Prepared equipment for maintenance.
- Opened lines and equipment.
- Changed seals and valves on on-line equipment.
- Changed seals and packing on pumps and valves.
- Changed and replaced pipes as required.
- Checked fluid levels in process equipment.

- Performed vibrational analysis.
- Performed steam-tracing techniques.
- Tested and replaced pressure release valves as needed.
- Diagnosed and repaired problems in processes and equipment as required.
- Completed reports to describe equipment troubleshooting and repair activities and discrepancies.
- Properly used and inspected hand tools.

PROVIDE ROUTINE AND PREVENTIVE MAINTENANCE AND SERVICE TO PROCESS CONTROL INSTRUMENTATION.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following equipment, materials and information:

Production schedule
Maintenance and service schedule
Maintenance and service procedures
Maintenance and service checklists
Instrument specifications
Verbal instructions
Maintenance equipment, tools and instruments
Maintenance supplies
Process control instrumentation

WORK TO BE PERFORMED

Provide routine and preventive maintenance and service to process control instrumentation to meet production schedule and instrument specification requirements.

PERFORMANCE CRITERIA

Routine and preventive maintenance and service shall be performed according to maintenance and service schedules and procedure and checklist requirements resulting in process control instrumentation which meets instrument specification requirements and is fully capable of producing products conforming to output specifications.

The work shall be accomplished in a safe, timely and cost-effective manner.

PERFORMANCE ELEMENTS AND ASSESSMENT CRITERIA

- Accessed and properly responded to Standard Operating Procedures (SOPs) and checklists associated with the maintenance and service of process control instrumentation before starting any work.
- Observed, communicated and recorded deviations from normal operations and deteriorating conditions of processes and instrumentation using both human senses and instruments.
- Initiated work requests.
- Developed and implemented a preventive maintenance schedule for instrumentation according to good process management standards.
- Inspected instrumentation.
- Prepared instrumentation for maintenance.

- Followed the instrument maintenance and service schedule developed by plant personnel.
- Recommissioned instruments by providing routine maintenance and service.
- Used a variety of on-line control equipment.
- Completed reports to describe instrument maintenance, service activities and discrepancies.
- Wrote the documentation for an instrument maintenance procedure that meets Occupational Health and Safety Administration (OSHA) requirements.
- Properly used and inspected hand tools.

TROUBLESHOOT AND CORRECT NONROUTINE PROCESS CONTROL INSTRUMENTATION PROBLEMS.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following equipment, materials and information:

Production schedule
Maintenance and service schedule
Maintenance and service procedures
Maintenance and service checklists
Instrument specifications
Verbal instructions
Maintenance equipment, tools and instruments
Maintenance supplies
Process control instrumentation

WORK TO BE PERFORMED

Troubleshoot and correct nonroutine process control instrumentation problems to meet production schedule and instrument specification requirements.

PERFORMANCE CRITERIA

Troubleshooting and correction of nonroutine process control instrumentation problems shall be performed according to maintenance and service procedure and checklist requirements resulting in process control instrumentation which meets instrument specification requirements and is fully capable of producing products conforming to output specifications.

The work shall be accomplished in a safe, timely and cost-effective manner.

PERFORMANCE ELEMENTS AND ASSESSMENT CRITERIA

- Accessed and properly responded to Standard Operating Procedures (SOPs) and checklists associated with the troubleshooting and correction of nonroutine process control instrumentation problems before starting any work.
- Observed, communicated and recorded deviations from normal operations and deteriorating conditions of processes and instrumentation using both human senses and instruments.
- Initiated work requests.
- Prepared instrumentation for maintenance.
- Diagnosed and repaired problems in processes and instrumentation as required.
- Used a variety of on-line control equipment.

- Recommissioned instruments by providing nonroutine repair and service.
- Completed reports to describe instrument troubleshooting, repair activities and discrepancies.
- Properly used and inspected hand tools.

CALIBRATE CONTROL INSTRUMENTS.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following equipment, materials and information:

- Production schedule
- Instrument calibration schedule
- Instrument calibration procedures
- Instrument calibration checklists
- Instrument specifications
- Verbal instructions
- Calibration equipment, tools and instruments
- Calibration supplies
- Process control instruments

WORK TO BE PERFORMED

Calibrate process control instruments to meet production schedule and instrumentation calibration requirements.

PERFORMANCE CRITERIA

Calibration of control instruments shall be performed according to calibration schedule and procedure and checklist requirements resulting in process control instrumentation which meets instrument specification requirements and is fully capable of producing products conforming to output specifications.

The work shall be accomplished in a safe and timely manner.

PERFORMANCE ELEMENTS AND ASSESSMENT CRITERIA

- Accessed and properly responded to Standard Operating Procedures (SOPs) and checklists associated with the calibration of process control instruments before starting any work.
- Observed, communicated and recorded deviations from normal operations and deteriorating conditions of processes and instrumentation using both human senses and instruments.
- Set up a calibration schedule according to calibration procedure requirements.
- Followed the calibration schedule developed by plant personnel.
- Checked instruments for calibration status and maintenance condition.
- Repaired instruments if necessary.
- Calibrated instruments and checked standards according to procedures.
- Properly labeled calibrated instruments with next calibration due date and other pertinent information.

- Completed reports to describe calibration activities and discrepancies.
- Wrote the documentation for a calibration procedure that meets calibration standards.
- Properly used and inspected hand tools.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following equipment, materials and information:

Production schedule
Operating procedure
Sampling procedure
Sampling checklist
Analytical procedure
Material specifications
Verbal instructions
Incoming, in-process and outgoing materials
Sampling equipment

WORK TO BE PERFORMED

Procure process materials for analysis to production schedule, operating procedure and sampling procedure requirements.

PERFORMANCE CRITERIA

Sampling of process materials shall be accomplished according to operating and sampling procedure requirements in a safe and timely manner. The sampling results in analytical samples which fully conform to operating, sampling and analytical procedure requirements.

PERFORMANCE ELEMENTS AND ASSESSMENT CRITERIA

- Assessed and responded to procedures associated with the collection of appropriate samples for analysis from process streams or products (solids/liquids/gases).
- Visually inspected samples to ensure adequate representation of the sampled materials and to determine if any immediate response is required.
- Labeled samples appropriately according to procedures.
- Prepared paperwork to submit samples for testing.
- Delivered samples to testing stations in a condition representative of the material.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following equipment, materials and information:

Production schedule
Analytical procedure
Material specifications
Verbal instructions
Incoming, in-process and outgoing materials
Analytical equipment and instruments
Analytical materials

WORK TO BE PERFORMED

Perform materials analyses to production schedule, operating procedure and analytical procedure requirements.

PERFORMANCE CRITERIA

Analysis of process materials shall be accomplished according to operating and analytical procedure requirements in a safe and timely manner. The analyses produce results which fully conform to operating and analytical procedure requirements and provide reliable data for process control and material/product acceptance purposes.

PERFORMANCE ELEMENTS AND ASSESSMENT CRITERIA

- Accessed and responded to procedures associated with the analysis of sample materials.
- Calculated normality, molality and molarity for the preparation of standard solutions.
- Analyzed quality control standards to appropriate precision levels.
- Prepared reagents and standards required to conduct tests.
- Calibrated and prepared testing instruments.
- Performed physical and chemical tests according to standard procedures.
- Measured pH using a variety of common techniques, demonstrating proper care and maintenance for each technique.
- Conducted chemical analyses using volumetric techniques such as acid-base titrations and redox titrations, according to ASTM or other pertinent standards.
- Used instrumental methods such as chromatography, infrared, basic spectrophotometry and colorimetry.
- Calculated results using calculators and computers.
- Performed calculations involving stoichiometry, solutions and physical properties.

- Set up, used and maintained automated equipment for conducting tests.
- Determined the necessity for resampling and/or reanalyzing.
- Compared sample analyses with control values with appropriate response.
- Maintained the analysis area to ensure correct results will be produced repeatedly.
- Reported analytical results to appropriate personnel using prescribed procedures or effective presentation techniques.
- Entered data into computers and other appropriate logs.

INTERPRET ANALYTICAL RESULTS FOR PROCESS CONTROL AND MATERIAL/PRODUCT ACCEPTANCE PURPOSES.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following equipment, materials and information:

Production schedule
Operating procedure
Process-variable specifications
Material/product specifications
Verbal instructions
Incoming, in-process and outgoing materials
Analytical test results

WORK TO BE PERFORMED

Interpret analytical test results for process control and product acceptance purposes to production schedule and operating procedure requirements.

PERFORMANCE CRITERIA

Interpretation of analytical test results for process control and material/product acceptance shall be accomplished according to operating procedure and material/product specification requirements enabling accurate and timely process control and material/product acceptance decisions to be made.

PERFORMANCE ELEMENTS AND ASSESSMENT CRITERIA

- Accessed and responded to procedures associated with the interpretation and reporting of analytical results for process control and material/product acceptance purposes.
- Reported analytical results to appropriate personnel using prescribed procedures or effective presentation techniques.
- Compared analytical test results to operating procedure and process variable specifications to determine if process variable adjustments are needed.
- Compared analytical test results to material/product specification requirements to make proper material/product acceptance and disposition decisions.
- Reviewed and analyzed trends of process variations and sample analyses.

PARTICIPATE IN TEAM PROBLEM-SOLVING AND PROCESS IMPROVEMENT ACTIVITIES.

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following equipment, materials and information:

Company participation and improvement policies, goals and guidelines
Production schedule
Material and product specifications and Material Safety Data Sheets (MSDS)
Operating procedures and checklists
Process variable specifications
Safety, health and environmental procedures and checklists
Federal, state and local safety, health and environmental regulations
Team, meeting, problem-solving and process-improvement guidelines
Verbal instructions
Plant buildings, meeting facilities, process units and grounds
Equipment, control instrumentation and tools
Products, materials and supplies

WORK TO BE PERFORMED

Participate in team problem-solving and process-improvement activities to achieve company quality and productivity improvement goals.

PERFORMANCE CRITERIA

Participation in team problem-solving and process-improvement activities shall be performed in a safe, willing, conscientious and collaborative manner, according to production schedule constraints and in full accord with applicable company policies, goals, procedures and guidelines.

PERFORMANCE ELEMENTS AND ASSESSMENT CRITERIA

- Reviewed, interpreted, prioritized and responded to company improvement goals and objectives.
- Formed and joined problem-solving and process-improvement teams to address high-priority improvement needs.
- Identified, prioritized and selected improvement opportunities from problem areas where customer needs are not being consistently met and where internal waste, errors and inefficiencies are excessive.
- Established measurable team improvement objectives and monitored improvement progress against these objectives.
- Used systematic, problem-solving and process-improvement methodologies, stressing root-cause analysis and permanent, preventive corrective actions.

- Used effective problem-solving and process-improvement tools and techniques such as flowcharts, check sheets, Pareto charts, cause-and-effect diagrams and histograms.
- Used sound sampling and statistical methods to gather, organize and analyze relevant data.
- Used Statistical Process Control techniques such as control charts and process capability analysis.
- Conducted efficient, focused, open and goal-driven team improvement meetings.
- Drew upon the ideas of all team members employing a consensus approach to decision making.
- Implemented and evaluated problem solutions, corrective actions and process improvements where approved.
- Suggested ideas to improve quality, productivity and customer satisfaction.
- Completed progress and final reports and documentation relating to problem-solving and process-improvement projects.
- Participated in the documentation of new or modified Standard Operating Procedures (SOPs).

PARTICIPATE IN EMPLOYEE TRAINING ACTIVITIES.

PARTICIPATE IN IMPROVEMENT AND TRAINING ACTIVITIES

SKILL STANDARD

CONDITIONS OF PERFORMANCE

Given the following equipment, materials and information:

Company training policies, goals and guidelines
Production schedule
Material and product specifications and Material Safety Data Sheets (MSDS)
Operating procedures and checklists
Process variable specifications
Safety, health and environmental procedures and checklists
Federal, state and local safety, health and environmental regulations
Employee training procedures, checklists, records and guidelines
Verbal instructions
Plant buildings, meeting facilities, process units and grounds
Equipment, control instrumentation and tools
Products, materials and supplies

WORK TO BE PERFORMED

Participate in employee training activities to achieve company training goals.

PERFORMANCE CRITERIA

Participation in employee training activities shall be carried out in a safe, willing, conscientious and collaborative manner, according to production schedule constraints and in full accord with applicable company policies, goals, procedures and guidelines.

PERFORMANCE ELEMENTS AND ASSESSMENT CRITERIA

- Reviewed, interpreted, prioritized and responded to company training policy, goals and objectives.
- Identified training needs for self and others.
- Accepted training from others in all aspects of job performance.
- Trained other employees as directed by supervision.
- Conducted classroom training.
- Completed records, reports and documentation relating to employee training.
- Participated in the development of Standard Operating Procedures (SOPs) for new or modified procedures.
- Communicated information effectively to co-workers.

Academic Skills	Skills (and related knowledge) contained in the subject areas and disciplines addressed in most national and state educational standards, including English, mathematics, science, etc.
Assessment	A process of measuring performance against a set of standards through examinations, practical tests, performance observations and/or the completion of work portfolios.
Content Standard	A specification of what someone should know or be able to do to successfully perform a work activity or demonstrate a skill.
Critical Work Functions	Distinct and economically meaningful sets of work activities critical to a work process or business unit which are performed to achieve a given work objective with work outputs that have definable performance criteria. A critical work function has three major components: • **Conditions of Performance:** The information, tools, equipment and other resources provided to a person for a work performance. • **Work to Be Performed:** A description of the work to be performed. • **Performance Criteria:** The criteria used to determine the required level of performance. These criteria could include product characteristics (e.g., accuracy levels, appearance), process or procedure requirements (e.g., safety, standard professional procedures) and time and resource requirements. The IOSSCC requires that these performance criteria be further specified by more detailed individual performance elements and assessment criteria.
Credentialing	The provision of a certificate or award to an individual indicating the attainment of a designated set of knowledge and skills and/or the demonstration of a set of critical work functions for an industry/ occupational area.
Illinois Occupational Skill Standards and Credentialing Council (IOSSCC)	Legislated body representing business and industry which establishes skill standards criteria, endorses final products approved by the industry subcouncil and standards development committee and assists in marketing and dissemination of occupational skill standards.
Industry	Type of economic activity, or product or service produced or provided in a physical location (employer establishment). They are usually defined in terms of the Standard Industrial Classification (SIC) system.

Industry Subcouncil	Representatives from business/industry and education responsible for identifying and prioritizing occupations for which occupational performance skill standards are adapted, adopted or developed. They establish standards development committees and submit developed skill standards to the IOSSCC for endorsement. They design marketing plans and promote endorsed skill standards across the industry.
Knowledge	Understanding the facts, principles, processes, methods and techniques related to a particular subject area, occupation or industry.
Occupation	A group or cluster of jobs, sharing a common set of work functions and tasks, work products/services and/or worker characteristics. Occupations are generally defined in terms of a national classification system including the Standard Occupational Classification (SOC), Occupational Employment Statistics (OES) and the Dictionary of Occupational Titles (DOT).
Occupational Cluster	Grouping of occupations from one or more industries that share common skill requirements.
Occupational Skill Standards	Specifications of content and performance standards for critical work functions or activities and the underlying academic, workplace and occupational knowledge and skills needed for an occupation or an industry/occupational area.
Occupational Skills	Technical skills (and related knowledge) required to perform the work functions and activities within an occupation.
Performance Standard	A specification of the criteria used to judge the successful performance of a work activity or the demonstration of a skill.
Product Developer	Individual contracted to work with the standard development committee, state liaison, industry subcouncil and IOSSCC for the adaptation, adoption or development of skill standards content.
Reliability	The degree of precision or error in an assessment system so repeated measurements yield consistent results.
Skill	A combination of perceptual, motor, manual, intellectual and social abilities used to perform a work activity.
Skill Standard	Specifies the knowledge and competencies required to perform successfully in the workplace.

Standards Development Committee	Incumbent workers, supervisors and human resource persons within the industry who perform the skills for which standards are being developed. Secondary and postsecondary educators are also represented on the committee. They identify and verify occupational skill standards and assessment mechanisms and recommend products to the industry subcouncil for approval.
State Liaison	Individual responsible for communicating information among all parties (IOSSCC, subcouncil, standard development committee, product developer, project director, etc.) in skill standard development.
Third-Party Assessment	An assessment system in which an industry-designated organization (other than the training provider) administers and controls the assessment process to ensure objectivity and consistency. The training provider could be directly involved in the assessment process under the direction and control of a third-party organization.
Validity	The degree of correspondence between performance in the assessment system and job performance.
Workplace Skills	The generic skills essential to seeking, obtaining, keeping and advancing in any job. These skills are related to the performance of critical work functions across a wide variety of industries and occupations including problem solving, leadership, teamwork, etc.

Margaret Blackshere **Ronald Morehead,** Official Designee	AFL-CIO
Hollis Earnest	Manufacturing/Electronics
David Emerson	Downstate National Bank
Bernard Gregory	Passavant Hospital
Michael O'Neill	Chicago Building Trades Council
Janet Payne	United Samaritans Medical Center
Gerald Schmidt	Illinois Manufacturing Association Caterpillar, Inc.
Jim Schultz	Illinois Retail Merchants Association Walgreen Company
Larry Vaughn	The Illinois State Chamber of Commerce Alternative School Network

Blouke Carus	President and Chief Executive Officer Carus Corporation
Gerson Ecker	Becker-Erhardt Company
George Knecht	Subdistrict Director United Steelworkers of America
Ken Knott	Business Agent District 9 Machinists
Steve Kopinski	Vice President Northwestern Tool & Die Manufacturing Corporation
Harry Litchfield	Deere & Company
Renee Loth	LoDan Electronics, Inc.
George Marshall	Hoffer Plastics
Bob Shaw	Lewis and Clark Community College
Norm Sherck	Information Staff Representative United Auto Workers
Gary Smith	General Manager Manufacturers' Brass and Aluminum Foundry
Norbert Stengel	President Northwestern Tool & Die Manufacturing Corporation
Gabe Verstraete	United Township High School
Marvin Wortell	Chairman Triton Industries, Inc.
Peter Wrenn	President Hudson Screw Machine Products Company

Diane Yasko	Motorola, Inc.
Ronald Engstrom	State Liaison Illinois State Board of Education
Dennis Gallo	State Liaison Illinois State Board of Education

APPENDIX D

CHEMICAL PROCESS TECHNICAL OPERATORS STANDARDS DEVELOPMENT COMMITTEE

Allen Arneson	UOP
Harry Benner	Akzo Nobel
Jeff Berry	Stepan Company
Debora Borgen	Rohm & Haas Co.
Leon Burnstein	Abbott Labs.
Jerry Caamano	The Dow Chemical Company
Blouke Carus	Carus Corporation
Allen Foster	Monsanto Company
Tom Harr	Quantum Chemical
Jo Hensch	3M Company
Dan Herter	Seeler Industries
Mark Homer	CICI (Chemical Industry Council of Illinois)
David Hood	Union Carbide Corp.
Gary Johnson	Monsanto Company
Scott Jones	UOP
Stan Kanderski	UOP
Myra Kania	Nalco Chemical Co.
Gary Kimbell	115th St. Corp.
Dave Kovars	Lonza, Inc.
Gary Malott	UOP

Kyrus McNeil	BASF Corp.
Bob Miller	Lonza, Inc.
William Moffatt	JLM Chemicals Inc.
Mike Moss	CICI (Chemical Industry Council of Illinois)
Lou Neiman	Diversified CPC Int.
Karen Nordquist	Nalco Chemical Co.
Monnie Ray	Henkel Corp.
Travis Rollins	Henkel Corp.
Ford Sakata	UOP
Dan Serafini	Carus Corporation
Brian Shimizy	C.P. Hall Co.
Ken Tague	Borden Chemicals and Plastics
Linda Verhulst	Borden Chemicals and Plastics
JoEllen Weeden	JLM Chemicals, Inc.
Walker Wells	Amoco Chemicals

Gene Coleman	Product Developer Consultant Northern Illinois University
Ronald Engstrom	State Liaison Illinois State Board of Education
Dennis Gallo	State Liaison Illinois State Board of Education

APPENDIX E

MANUFACTURING SUBCOUNCIL CHEMICAL PROCESS TECHNICAL OPERATORS RECOGNITION PROPOSAL

I. Occupational Definition and Justification

A. Occupational Definition

The Manufacturing Subcouncil identified process technical operators as a major occupational cluster in manufacturing. Process technical operators operate, control and monitor continuous and batch chemical processes.

The American Chemical Society (ACS) has developed national standards for process technical operators. These standards include skill standards and employability standards. Employability standards refer to those skills that workers should have before beginning training as a process technical operator. The Manufacturing Subcouncil voted to endorse these national standards for Illinois as reformatted to meet the format requirements of the Illinois Occupational Skill Standards and Credentialing Council (IOSSCC).

The standards development committee convened by the Chemical Industry Council of Illinois (CICI) reviewed and extended the national skill standards. The standards development committee identified the major job titles for these standards. The Illinois Occupational Information Coordinating Council (IOICC) then used these job titles to identify the following occupations

- Chemical Plant and System Operators
- Chemical Equipment Operators
- Chemical Technologists and Technicians
- Petroleum Refining Control Panel Operators

B. Employment and Earnings Opportunities

These chemical process technical operator occupations have a generally favorable employment outlook in Illinois, according to the IOICC, based on data provided by the Illinois Department of Employment Security. According to the IOICC, the employment projections for Illinois and the nation indicate average growth for the occupations in this cluster. Job opportunities should be numerous given the number of additional openings due to replacement needs.

These process technical operator occupations also meet the IOSSCC earnings criteria based on data provided by the IOICC and shown below.

- Chemical Plant and Systems Operators ..... $23,700-$33,900
- Chemical Equipment Operators ..... $23,500-$29,800
- Chemical Technologists and Technicians ..... $29,430-$34,400
- Petroleum Refining Control Panel Operators ..... $25,160-$32,240
- Petroleum Technologists and Technicians ..... $23,600-$31,850

These earnings represent the middle range (middle 50 percent) annual earnings in Illinois in 1995.

C. Career Opportunities and Education and Training Requirements

Process technical operators skills meet the IOSSCC criteria for education and training requirements and career opportunities. These skills require basic workplace skills and advanced technical training. The workplace and advanced technical skill requirements are detailed in the "Employability Performance-based Skill Standards." The advanced technical skill requirements are detailed in the occupational skill standards.

II. Occupational Standards and Credentials

A. Occupational Skill Standards

The national skill standards developed by the ACS and extended by the Illinois standards development committee meet all IOSSCC content requirements and have been translated into the IOSSCC format.

B. Assessment and Credentialing System

The American Chemical Society (ACS) is in the second stage of its national skill standards project funded by the U. S. Department of Education. In this second stage, the ACS will work with states to develop an assessment and credentialing system. Illinois has been contacted as one of the states to participate in this stage. The standards development committee members are committed to working with the ACS and the IOSSCC in developing assessment and certification systems for both the occupational skill standards and the employability performance skill standards.

III. Industry Support and Commitment

A. Industry Commitment for Development and Updating

The ACS conducted a national validation of the national process technical operator skill standards through regional and state technical working groups and national surveys. The Illinois Manufacturing Subcouncil established a standards development committee to approve and extend the national standards and oversee the reformatting of the standards. The standards development committee met twice to review the national standards and to review and approve the extension and reformatting of these standards. The standards development committee approved these standards, and the Manufacturing Subcouncil voted to endorse them as reformatted.

The ACS and the CICI are committed to completing, maintaining and updating the national process technical operators skill standards for use in Illinois.

B. Industry Commitment for Marketing

The CICI and affiliated Illinois companies and industry organizations are committed to promoting and marketing the chemical process technical operator standards and credentialing system in Illinois. Letters of commitment are available on request from the Illinois State Board of Education.

A. Developing an Employment Plan	1. Match interests to employment area. 2. Match aptitudes to employment area. 3. Identify short-term work goals. 4. Match attitudes to job area. 5. Match personality type to job area. 6. Match physical capabilities to job area. 7. Identify career information from counseling sources. 8. Demonstrate a drug-free status.
B. Seeking and Applying for Employment Opportunities	1. Locate employment opportunities. 2. Identify job requirements. 3. Locate resources for finding employment. 4. Prepare a resume. 5. Prepare for job interview. 6. Identify conditions for employment. 7. Evaluate job opportunities. 8. Identify steps in applying for a job. 9. Write job application letter. 10. Write interview follow-up letter. 11. Complete job application form. 12. Identify attire for job interview.
C. Accepting Employment	1. Apply for social security number. 2. Complete state and federal tax forms. 3. Accept or reject employment offer. 4. Complete employee's Withholding Allowance Certificate Form W-4.
D. Communicating on the Job	1. Communicate orally with others. 2. Use telephone etiquette. 3. Interpret the use of body language. 4. Prepare written communication. 5. Follow written directions. 6. Ask questions about tasks.
E. Interpreting the Economics of Work	1. Identify the role of business in the economic system. 2. Describe responsibilities of employee. 3. Describe responsibilities of employer or management. 4. Investigate opportunities and options for business ownership. 5. Assess entrepreneurship skills.
F. Maintaining Professionalism	1. Participate in employment orientation. 2. Assess business image, products and/or services. 3. Identify positive behavior. 4. Identify company dress and appearance standards. 5. Participate in meetings in a positive and constructive manner. 6. Identify work-related terminology. 7. Identify how to treat people with respect.

G. Adapting to and Coping with Change	1. Identify elements of job transition. 2. Formulate transition plan. 3. Identify implementation procedures for a transition plan. 4. Evaluate the transition plan. 5. Exhibit ability to handle stress. 6. Recognize need to change or quit a job. 7. Write a letter of resignation.
H. Solving Problems and Critical Thinking	1. Identify the problem. 2. Clarify purposes and goals. 3. Identify solutions to a problem and their impact. 4. Employ reasoning skills. 5. Evaluate options. 6. Set priorities. 7. Select and implement a solution to a problem. 8. Evaluate results of implemented option. 9. Organize workloads. 10. Assess employer and employee responsibility in solving a problem.
I. Maintaining a Safe and Healthy Work Environment	1. Identify safety and health rules/procedures. 2. Demonstrate the knowledge of equipment in the workplace. 3. Identify conservation and environmental practices and policies. 4. Act during emergencies. 5. Maintain work area. 6. Identify hazardous substances in the workplace.
J. Demonstrating Work Ethics and Behavior	1. Identify established rules, regulations and policies. 2. Practice cost effectiveness. 3. Practice time management. 4. Assume responsibility for decisions and actions. 5. Exhibit pride. 6. Display initiative. 7. Display assertiveness. 8. Demonstrate a willingness to learn. 9. Identify the value of maintaining regular attendance. 10. Apply ethical reasoning.
K. Demonstrating Technological Literacy	1. Demonstrate basic keyboarding skills. 2. Demonstrate basic knowledge of computing. 3. Recognize impact of technological changes on tasks and people.
L. Maintaining Interpersonal Relationships	1. Value individual diversity. 2. Respond to praise or criticism. 3. Provide constructive praise or criticism. 4. Channel and control emotional reactions. 5. Resolve conflicts. 6. Display a positive attitude. 7. Identify and react to sexual intimidation/harassment.
M. Demonstrating Teamwork	1. Identify style of leadership used in teamwork. 2. Match team member skills and group activity. 3. Work with team members. 4. Complete a team task. 5. Evaluate outcomes.

APPENDIX G

EMPLOYABILITY PERFORMANCE-BASED SKILL STANDARDS (Skills to be demonstrated at time of hiring or within 90 days of hiring)

MATHEMATICS AND STATISTICS SKILLS

- Use hand-held calculator.
- Use decimal numbers and fractions.
- Calculate percentages.
- Read and construct graphs using several scales.
- Calculate ratios.
- Perform unit conversions.
- Solve simple algebraic equations.
- Recognize patterns from data.
- Perform chemical calculations.
- Calculate temperature, pressure and volume relationships.
- Conduct statistical analysis involving means, ranges, proportions and standard deviations.
- Construct frequency distributions for raw data.
- Develop and interpret trend (run) charts.
- Develop and interpret control charts.
- Calculate and plot control limits.
- Develop and interpret simple, two-variable, scatter diagrams.

COMPUTER LITERACY SKILLS

- Describe basics of computer architecture and uses for computers.
- Demonstrate good keyboarding skills.
- Use computers to input, store and retrieve data.
- Use computers to access procedures.
- Use computers to access emergency response procedures.
- Use computers to access Standard Operating Procedures (SOPs), Material Safety Data Sheets (MSDSs) and other pertinent information.
- Use computers to access and maintain inventory.
- Develop and maintain database.
- Use electronic communication techniques such as e-mail.
- Keep computer logs.
- Use, maintain and develop spreadsheets.
- Use microprocessors that are components of instruments.
- Identify and describe a variety of computer-driven control systems and interfaces.
- Use word processors to create, edit and retrieve document files.

COMMUNICATION SKILLS

- Demonstrate effective speaking and listening skills.
- Use spoken language to accurately communicate ideas and information and to ask and answer questions.
- Describe the barriers to effective verbal communication.
- Read, comprehend, interpret, evaluate and use a wide variety of written materials.
- Maintain logs and notes.
- Prepare shift turnover reports.
- Inform all who need to know about any deviations.
- Interact with other personnel in reporting data and information.
- Write clear instructions.

COMMUNICATION SKILLS *(Continued)*

- Complete and route forms.
- Fill out checklists.
- Report data using prescribed procedures.
- Communicate using electronic mail.
- Read and follow procedures.
- Read and prepare diagrams.
- Write procedures.
- Develop relationships with vendors for information acquisition.
- Communicate appropriately with public in plant upset situations.

WORKPLACE SKILLS

- Participate as a team member.
- Work independently.
- Demonstrate sense of responsibility for co-workers.
- Work under pressure.
- Solve problems using standard techniques.
- Perform root-cause analysis.
- Demonstrate the value of diversity.
- Observe and respond to abnormal conditions.
- Demonstrate ethics in all aspects of work.
- Apply safety, health and environmental principles and practices in all aspects of work.
- Apply quality principles in all aspects of work.
- Demonstrate valuing the opinions of others.
- Prioritize work.
- Demonstrate critical thinking.
- Show adaptability and flexibility regarding schedules.
- Coordinate several tasks during nonroutine and upset conditions.
- Maintain a clean working area.
- Make observations and recognize patterns.
- Demonstrate paying close attention to details.
- Identify patterns in electronic data.
- Demonstrate willingness to participate in continuing education.

GENERAL PLANT SKILLS

- Describe general PTO day-to-day duties, tasks and responsibilities.
- Participate in basic emergency operations.
- Describe typical shift patterns.
- Select balances and sales based on quantity and accuracy required.
- Demonstrate proper lifting and climbing techniques.
- Demonstrate use of forklift and other heavy equipment.
- Demonstrate the proper use of safety equipment such as respirators and self-contained breathing apparatus.
- Describe basic fire-fighting equipment and procedures.
- Demonstrate basic plant maintenance skills: pipe fitting, pump and valve packing, etc.
- Describe the basics of the wastewater treatment process.

GENERAL PLANT SKILLS *(Continued)*

- Describe the basic procedures for spill prevention.
- Describe government discharge and release restrictions.
- Describe plant utilities systems.
- Describe procedures for preparing mechanical equipment for maintenance.
- Maintain good housekeeping.
- Use monitors to detect leaks, detect hazardous atmospheres *and* measure temperature.
- Order materials and equipment.
- Change pressurized cylinders.
- Troubleshoot and analyze process problems.
- Interpret piping and instrumentation drawings, flow charts and symbols.
- Describe the fundamentals of routine and emergency chemical plant and refinery startup and shutdown including all safety considerations.
- Describe the integrated operation of chemical plant systems, subsystems and equipment in the process unit.

EQUIPMENT AND INSTRUMENTATION SKILLS

- Identify the major types of pumps and know their basic principles of operation.
- Describe the safety aspects and cold-service problems of pump operation.
- Identify the basic types of compressor and describe their basic principles of operations.
- Describe the safety and preventive maintenance aspects of compressor operation.
- Describe the operational effects of compressor surge and stonewall.
- Identify the different types and sizes of valves and describe their construction, principles of operation and typical uses.
- Describe proper valve operation, preventive maintenance and safety precautions.
- Describe the importance and benefits of proper lubrication.
- Identify the basic types of heat exchangers and describe their construction, operation and maintenance requirements.
- Describe the basics of furnaces and fired heaters including their efficient, economical and safe operation.
- Describe the operational aspects of draft, air and fuels and the important points for normal heating operations.
- Describe the importance of handling steam condensation in a steam-powered plant.
- Identify the basic types of steam traps and describe their basic principles of operation and needs for upkeep.
- Describe the construction of a typical steam turbine, its applications and maintenance requirements and its operational hazards such as vibration, overspeed, underspeed and varying steam loads.
- Describe the major forms of distillation and examples of operation and identify the different types of trays used in towers and their characteristics.
- Describe the basic principles and applications of chemical plant automation including pneumatic and electronic operation, control valves, variable measurements, remote instrumentation, computer control and process control.

EQUIPMENT AND INSTRUMENTATION SKILLS *(Continued)*

- Describe the role of water in chemical plant cooling and heat dissipation and the operational aspects of piping, corrosion, cooling towers and water treatment.
- Describe basic actuator principles, terminology, types and applications including methods of troubleshooting actuators and their accessories.
- Describe basic refrigeration principles and the operation of important refrigeration equipment such as compressors, condensers, expansion valves, accumulators and chillers.

APPLIED SCIENCE SKILLS

- Describe vacuum and its applications.
- Describe gas laws and their applications.
- Describe the basic properties of matter such as density and viscosity.
- Describe Bernoulli's principles and their applications.
- Identify and describe key fundamentals of general chemistry including matter versus energy, chemical and physical changes, atomic and molecular structure, molecular bonding, mixtures and compounds, acids, bases and salts, gas mixture calculations, distillation, vapor pressure, viscosity and fluid flow.
- Identify and describe key types of organic chemicals including hydrocarbons, paraffins or alkanes and iso-paraffins, olefins or alkanes, di-olefins and alkynes, cyclo-paraffins, aromatics and dicyclic aromatics or naphthalenes and mercaptans.
- Describe basic electrical principles and applications including resistance, impedance, current, voltage and power, parallel and series circuits and AC and DC power.
- Identify and describe the functions of common control components including limit switches, pushbuttons and relays, motor starters, transformers and pilot lights.
- Describe safe electrical practices including safe electrical connections and disconnections.
- Describe the principles of basic circuit design.
- Interpret ladder diagrams.
- Describe fuse and breaker applications.
- Describe National Electrical Code requirements for basic circuits.

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